SCIENCE & GOVERNMENT REPORT

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Research Gets Favored Treatment in '77 Budget

The budget that Mr. Ford sent to Congress on January 21 reflects his quixotic view that the government he heads is a hostile force against which war must be waged in behalf of the American people.

The spending plan for Fiscal Year 1977, which begins October 1, is mean to the poor, the elderly, the infirm, the unemployed, and an assortment of other politically unarmed segments of the population.

But in an extraordinary turnabout from recent years, it is uniquely kind to the conglomeration of people and institutions known as the research and development community. And there is even an extra helping for the long-beleaguered practitioners of basic research. The motivations for these generosities is something we will attempt to understand later in this article. But first, let us look at the figures, keeping in mind Samuel Johnson's caveat, "Round numbers are always false," and also the fact that election-year budgets are an established form of campaign literature.

Detailed analyses of various components of the President's budget are contained on the inside pages.

While the overall federal budget—Congress willing—is projected to rise by only 5.5 per cent, obligations for the conduct of research and development and construction of facilities are scheduled to rise by 11 per cent, to a record high of $24.7 billion. Since inflation for Fiscal Year 1977 is forecast at approximately 6 per cent, the budgetmakers thus chose to let most non-R&D federal activities suffer a slight drop in purchasing power; R&D, on the other hand, is slated for that rare experience, real growth, though the increase goes only a small way toward making up for the erosion caused by past budgets.

Now, of that $24.7 billion, $23.5 billion comes under the heading of "conduct of research and development," with the balance budgeted for construction. The "conduct" figure represents a $2.2-billion increase over the present fiscal year, and, as has been the case in most recent years, the Defense Department weighs in for the bulk of the growth—$1.3 billion of the new money, thus maintaining its position as consumer of roughly half of all federal R&D appropriations.

Another big growth area is energy R&D, which, under the Energy Research and Development Administration, is scheduled to rise 38 per cent, to a total of $2.6 billion for ERDA, apart from what it spends on nuclear weapons and naval reactors. The figure for the latter category is $775 million, an increase of $26 million.

Comparisons of the health research figures are confused by the fact that for the current fiscal year, Congress voted sums in excess of the Administration's request, the President vetoed the bill, and, pending an attempt to override the veto, spending is at the pace of Fiscal 1975, which was swollen by the release of funds that Nixon had impounded. As a result, the amount of money that will be available for the current year is uncertain. From a policy perspective, however, the most significant fact is that among an assortment of bewilderingly different budget estimates and comparisons

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In Brief

With the Senate rapidly moving toward approving legislation to create the White House Office of Science and Technology Policy (OSTP), it's still unclear who's to be the director (SGR Vol. VI, No. 1). TRW founder Simon Ramo, who is most often mentioned, says he's "not a candidate," but he acts like one. Last month, Ramo, saying it was strictly a TRW affair, invited in the Washington science press corps and droned on for two hours, with little said about TRW. Lately popping up in the rumor mill is Bell Labs' William O. Baker.

Meanwhile, the advisory groups that Ramo chairs with Baker have endorsed plans for a trial of the "science court" scheme long plugged by Avco-Everett's Arthur Kantrowitz. The basic idea is to obtain expert, impartial judgments on scientific and technical components of public policy controversies, such as ozone depletion and nuclear safety. Ramo says the advisory groups will look for a federal agency to sponsor a tryout of the plan.

A "Research Study on Science Communication," sponsored by Canada's Ministry of State for Science and Technology, found that "More than 80 percent of the population over age 15 believe it important to be kept informed about science. Yet two thirds of them cannot name one Canadian scientist." Two thousand randomly selected persons were interviewed for the study.

NSF Given 20 Per Cent Boost for Basic Science

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released by HEW, there is a table that suggests that the Administration has accepted the argument that cancer research, and, to a lesser extent, heart research, have prospered at the expense of other responsibilities of NIH, and that the balance should be corrected.

It should be noted, too, that there are tables that indicate that, under certain appropriations assumptions, they ought to continue taking a massive proportion of the overall NIH budget. However, though the numbers are soft, the signal is clear.

Thus, one of several official HEW budget briefing papers lists the National Cancer Institute at $687 million for the current fiscal year; the figure for the new budget is a token $1 million more. The National Heart and Lung Institute is listed at $305 million; the increase for next year is $38 million, but that sizeable growth must be viewed against the fact that heart research never took off financially, despite a statutory commitment and a masterplan that was supposed to put it in league with cancer research.

Meanwhile, the other NIH institutes, following complaints of long years of neglect (SGR Vol. V, No. 18), are budgeted to share a boost of $120 million.

In presiding over the annual press briefing on the budget, NSF Director H. Guyford Stever, who doubles as the President's science adviser, said that defense, energy, and basic research were singled out this year for favorable treatment. But Stever, who will put aside one of his roles when Congress completes action on the creation of a White House science office, appeared to take special pride in the basic research budget. The reason may be that he has little or nothing to do with defense R&D; energy has its own political dynamic, while his own agency, NSF, is the patron of academic basic research, which has had some bad years recently. Consequently, he had something to crow about when he told the press that government-wide support for basic research would rise by 11 per cent in the new budget, while NSF's basic research support would go up nearly 20 per cent.

"The NSF increase, "he said, "reflects an awareness of the importance of this agency's role in the support of basic research and the Administration's recognition of its importance to the nation."

He also noted that the new budget "represents a major effort on the part of the Administration to bolster science and to ensure for the United States a strong basic research program in all major fields of science and engineering. A specific aim of this program is to counteract the gradual decrease of federal support for basic research, which has declined about 23 per cent in terms of constant dollars since 1968."

No New Grants for NIH?

According to Leon Schwartz, Associate NIH Administrator for Administration, Ford's proposed budget for FY 1976 would mean that no new competing grants will be funded until next October - in fact, he said, none has been funded since last October 1 - and the budget proposed for FY 1977 would enable NIH to fund only about 37 per cent of grant applications approved by peer review groups. By comparison, 57 per cent of approved grants were funded last year.

A loyal team player, Stever has never publicly challenged the argument that the present science advisory setup has proven to be a failure. Both publicly and privately, he acknowledges that it would benefit from White House status. But in private conversations he goodnaturedly takes the position that the dual-hatted arrangement has worked out considerably better than is conceded by agitators for a return to the White House. And in what was probably his swansong as presidential science adviser, he modestly said the boost in the R&D budget "is significant, especially in view of the tightness of this year's overall US budget," adding that it "illustrates the high priority placed by the Administration on science and technology because of what it can contribute to the achievement of national goals."

Why this favorable treatment? It is probable that a number of things came together this year to create the outcome. First of all, kindness to R&D does not put Ford into collision with Reagan, who is yet to discover that free enterprise and most of science long ago parted

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FEDERAL OBLIGATIONS FOR CONDUCT OF R&D BY SELECTED AGENCIES (MILLIONS OF DOLLARS)

DEPARTMENT OR AGENCY	FY 1975 ACTUAL	FY 1976 EST.	FY 1977 EST.	DIFFERENCE FY 1976-77	% CHANGE FY 1976-77
TOTAL	$19,023	$21,338	$23,465	+ $2,127	+ 10%
DEPARTMENT OF DEFENSE	8,987	9,879	11,198	+ 1,319	+ 13%
NASA	3,088	3,473	3,573	+ 100	+ 3%
ERDA	2,071	2,812	3,282	+ 470	+ 17%
HEW	2,395	2,369	2,570	+ 201	+ 8%
NATIONAL SCIENCE FOUNDATION	604	628	726	+ 98	+ 16%
DEPARTMENT OF AGRICULTURE	424	483	507	+ 24	+ 5%
DEPARTMENT OF TRANSPORTATION	291	340	319	— 21	— 6%
DEPARTMENT OF INTERIOR	296	332	316	— 16	— 5%
EPA	258	305	241	— 64	— 21%
DEPARTMENT OF COMMERCE	222	247	243	— 4	— 2%
VETERANS ADMINISTRATION	99	108	106	— 2	— 2%
NUCLEAR REG. COMMISSION	61	97	109	+ 12	+ 12%
HUD	57	62	70	+ 8	+ 13%
DEPARTMENT OF JUSTICE	44	65	41	— 24	— 37%
ALL OTHER	126	138	164	+ 26	+ 19%

BUDGET *(Continued from Page 2)*

company. Thus, the option was there for an increase.

Of significance, too, is the fact that R&D benefits from the presence of a dedicated little lobby high up in the Administration. Rockefeller is a deep believer in R&D, and, though on the way out, presides over a network of proteges that he planted throughout the Administration in more promising times. Working from the outside, several influential Republicans—notably William O. Baker and Simon Ramo, co-chairmen of the newly created White House science advisory groups—have been plugging for a bit of relief for R&D on the grounds that it is hurting from neglect.

To support the case for more money, they have been able to offer up those innumerable studies—at last of some effect—that conclude that investment in R&D is a good bet for a nation faced by tough foreign competition and lots of domestic problems.

Finally, the increase—$2.2 billion—is not going to break the bank. It's only a bit more than double the percentage of increase in an overall budget of $395 billion. The bulk of the R&D growth is for defense and energy, which are hard to stop these days. The basic research growth is welcome, but scarcely munificent in view of Stever's reference to a 23 per cent decline since 1968.

Taking the budget at face value, R&D has been treated relatively well, but for good and obvious reasons. However, it is important to note that even if Congress delivers that money, austerity will still predominate. Too many years of inflation and tight budgets have gone by for an 11 per cent increase to wipe out the effects. —DSG

Science Enrollments Climb

Enrollment in full-time graduate courses in science and engineering has increased for the second straight year, with enrollment in the life sciences again showing the largest growth rate, NSF reports.

Based on responses to questionnaires sent to graduate departments last fall, NSF's estimate is that the total number of graduate students has increased by about 4 per cent as compared with a year ago. A similar increase was reported in 1974.

Enrollment in life sciences, engineering and social sciences all increased significantly, by 8, 6 and 5 per cent, respectively, while enrollment in graduate psychology courses dipped by about 3 per cent. The number of graduate students in physical and mathematical sciences remained constant, a trend which NSF suggests reflects "growing student awareness of slackening job opportunities in these fields."

(The study, NSF 75-335, is available from the National Science Foundation, Washington DC 20550, free of charge.)

Wiesner Heads OTA Council

MIT President Jerome B. Wiesner has been elected chairman of the advisory council of the Congressional Office of Technology Assessment. Wiesner, who was science adviser to President Kennedy, succeeds Harold Brown, president of Caltech.

ERDA Budgeted for 38 Per Cent Increase for Research

The lion's share of the increases proposed for non-military R&D in Mr. Ford's budget would again be swallowed up by energy research and development programs. Though Congress is not likely to balk at that fact, Ford's energy R&D proposals are nevertheless likely to raise some hackles on Capitol Hill since they would sharply increase spending on nuclear energy, and in particular they would give a massive boost to the troubled liquid metal fast breeder reactor (LMFBR) program.

The actual amount being proposed for energy R&D depends on which set of figures you use, but according to an analysis prepared by NSF's Office of Energy Policy, which is as good as any, the budget would provide a 38 per cent increase in direct support of energy R&D, from $1.9 to $2.6 billion. A further $600 million has been proposed for closely related basic research and environmental studies.

In contrast to the previous two years, when the energy R&D budget was thrown together at the last moment as a composite of programs scattered throughout many different departments and agencies, this year's effort is largely the work of the Energy Research and Development Administration. ERDA now accounts for some 90 per cent of the total proposed budget for energy R&D.

The proportion of ERDA's budget devoted to R&D on nuclear reactors and related studies such as radioactive waste disposal, safeguards, and so on, would actually increase, according to the budget proposals, thereby reversing the trend of the past couple of years. Nuclear R&D is set to increase from $775 million to $1170 million, a 57 per cent jump.

A good deal of that increase would go to the LMFBR, which alone would carry off $655 million next year if ERDA gets its way. Construction is planned to begin on a large demonstration breeder reactor, which will be built on the Clinch River near Oak Ridge, Tennessee. That plant, which is the centerpeice of the LMFBR program, has been subject to several delays and it is now expected to cost a total of $1.9 billion - $200 million more than estimated a year ago.

Other priority nuclear power programs proposed by

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Space Shuttle Dominates NASA Budget Plans

For the second straight year, NASA has been forced to mortgage space science to pay for development of the space shuttle. Following a year in which no new projects will be started, the budget proposed for NASA in Fiscal Year 1977 would shrink spending on space science, allow construction to begin on only one new scientific satellite, and force deferral or abandonment of three key science projects, each of which has been given a high priority by space scientists.

NASA Administrator James C. Fletcher did not try to conceal his disappointment with the proposed budget when he described NASA's plans to reporters at a briefing January 20. Fiscal year 1977, he said, "will be another year of tight constraints, minimal budgets and limited new activities." At $3.7 billion, NASA's proposed budget would grow by only 4 per cent, less than inflation's expected bite, and about $200 million less than NASA officials had hoped to get.

The chief problem is that while NASA's total budget has remained approximately constant for the past few years, spending on the shuttle has been growing rapidly. About $1.3 billion is projected for shuttle development next year, some 35 per cent of NASA's budget; in 1975, the proportion was 24 per cent.

Consequently, the total budget for space science is set to shrink from $434 million to $379 million. The one new science project to be given the green light is a spacecraft to study solar flares, sunspots and other phenomena, which are expected to reach peak activity in 1979-81.

NASA had also hoped next year to begin constructing the Large Space Telescope, an optical telescope planned to be launched by the shuttle in the early 1980, and a Pioneer spacecraft to make a detailed study of Jupiter. Both of those projects, which have been accorded top priority by the Space Science Board of the National Academy of Sciences, have had to be deferred, however. And another high priority mission - a Mariner spacecraft planned to rendezvous with Uranus in 1985 - has been abandoned entirely.

Other parts of NASA's budget are also being squeezed, though not as tightly as space science. Plans to upgrade a wind tunnel at the Ames Research Center have been postponed, and the schedule for completing the shuttle has been stretched slightly.

A budget of $3.7 billion still represents a hefty slice of the total federal R&D effort, however, and Congress would probably gag on anything much larger.

Reported Cancer Increase Attributed to Errors in Data

Statisticians at the National Cancer Institute have tentatively concluded that methodological errors are responsible for the 5.2 per cent jump in the crude cancer death rate for the first seven months of 1975 recently reported by the National Center for Health Statistics. In most recent years, the increase has been around 1 per cent.

"A true increase of this magnitude would be quite startling," Leonard Chiazze Jr., acting chief of the NCI Biometry Branch, told the President's Cancer Panel on January 21. Chiazze then went on to describe a data collection system that does not invite confidence.

The figures, he noted, are not age-adjusted; they are assembled on the basis of deaths as they are reported, not as they occur and "double counting for a State can occur in a given month."

"A comparison of the final date for the first seven months of 1974 with the provisional data for 1975," he said, "would indicate a 4.8 per cent increase . . . A comparison of the final data for all of 1974 with the provisional data for the first seven months of 1975 would indicate a 4.6 per cent increase. Finally, a comparison of the final data for 1974 with the most recently published provisional estimate (for 9 months of 1975) yields a 2.8 per cent increase. Note," he added, "that the 5.2 per cent increase no longer exists."

Chiazze concluded, however, with the observation that "At this stage it seems reasonable to conclude that there is an upward trend of undetermined size in something. Exactly what this means remains unclear but it is indicative of the need for further study."

Amidst the increasingly turbulent politics of cancer research, the figures are of considerable importance. With the prevention camp at NCI clamoring for additional funds, a sharp increase in cancer deaths provides ammunition for the argument that more effort must be put into identifying and eliminating environmental sources of cancer, since a virtual "epidemic" is breaking out. If the figures are relatively stable, however, the present strategy, with emphasis on cures, has a strong case for maintaining the status quo in priorities.

Officials of NCI's Division of Cause and Prevention publicly take the line that present funding is adequate. But in an internal memo, they are urging that funding rise from $114 million as proposed in the President's new budget to $151 million for the following fiscal year.

ENERGY *(Continued from Page 4)*

ERDA are efforts to improve the performance of light water reactors, speed up the construction of new power plants, and upgrade the search for a permanent disposal site for radioactive wastes.

Those proposals are consistent with ERDA's aim, as outlined in the energy R&D plan published by ERDA last June, of solving some of the technical problems which are likely to crimp the growth of nuclear fission. The proposals represent a larger government share in the light water reactor program than was anticipated a few years ago, when it was hoped that private industry would take responsibility for most light water reactor and fuel cycle technologies.

Though members of Congress are likely to complain bitterly about ERDA's increased commitment to nuclear power, with opposition focused on the budget for the LMFBR, it is unlikely that nuclear opponents have the votes to reduce the proposed expenditures significantly. Attempts to cut the LMFBR budget in both the House and the Senate were easily defeated last year, and similar moves to eliminate controversial Price-Anderson liability limits for compensation for damages suffered from a nuclear accident failed by surprisingly large margins in December. Those votes probably provide a good measure of anti-nuclear sentiments in Congress.

Another noteworthy feature of the energy R&D budget is a proposal for a massive increase in spending on fusion R&D, from $250 million to $392 million. Much of that increase will be taken up by the Tokamak Fusion Test Reactor, a large machine under construction at Princeton University.

As for non-nuclear technologies, little change of emphasis is discernable in the budget proposals, though conservation and solar R&D are both favored with large percentage increases. Since both of those programs are particular favorites of Congress, which consistently criticizes the Administration for being too miserly with respect to support for solar technologies, further increases can be anticipated when ERDA's budget finally emerges from Capitol Hill.

As is customary, when the energy budget was explained to reporters last week, Administration officials noted that the goal is to make the United States self-sufficient in energy. The target date is still 1985, according to Frank Zarb, head of the Federal Energy Administration, though he hastened to add that self-sufficiency does not necessarily mean an end to oil imports. —CN

Social Science: Budget Cutbacks for ADAMHA...

Budget plans for the Alcohol, Drug Abuse and Mental Health Administration continue the Nixon-era drive to eliminate professional training and categorical services as federal responsibilities. ADAMHA's budget dominates the spending picture for the behavioral and social sciences next year and makes the figures proposed elsewhere look good.

Based on the current budget, next year's cuts for mental health research alone would total roughly $13 million. The mental health training fund, slashed to $30 million from $85 million, would pay for only half the program's continuing commitments. On top of that, community mental health centers would be folded into the Administration's $10-billion health block grant scheme.

The budget documents do not reflect the cutbacks. This is because the newly issued requests are based on what the Administration proposed this time last year for the current fiscal period, ignoring the higher continuing resolution under which HEW actually has been operating. The budget situation at ADAMHA has been further complicated by the Administration's attempts to force spending this year back to the original FY1976 request.

In an encore to the fancy budget footwork displayed last year, Ford asked Congress to rescind some ADAMHA budget items recently provided for this year in a supplemental budget. The rescission would erase $3 million in mental health research, funded under new authority for research on rape, and some $53.5 million in newly legislated community mental health center money. In addition, Ford has been seeking since last summer to delay spending research funds in excess of the FY76 allowance. The immediate effect of that deferral action has been to stall awarding over $4 million in mental health research grants, holding up as many as 70 awards to grantees.

The net result of the ever-widening gap between Administration attempts to cut ADAMHA and Congressional attempts to build it up is another in a long series of bizarre budget binds. If Congress makes its relatively generous decisions stick for one year, without carefully attending to the following year's budget, ADAMHA would wind up overcommitted and in the hole.

There is no evidence that Congress will go along with the Administration's proposals. But ADAMHA constituents are concerned that executive budget games of the past few years are wearing down the agency's advocates on the Hill. They cite the delay of Congress in passing authorization for research training, legislation affecting behavioral and biomedical programs. They are also worried that growing public disenchantment with federal spending may increase the Office of Management and Budget's chances of getting what it has wanted for years.

With the exception of proposed level funding for drug abuse research at $34 million and a $20 million boost to total $160 million for drug treatment — both actions are to implement the White Paper on Drug Abuse of some months back — what the Administration wants at ADAMHA is some research and little else.

But even research would be squeezed. NIMH asked OMB for a research increase but received $83 million, substantially less than the $95.9 million Congress appropriated for this year. In actual number of grants, that would mean a drop from 949 to 875. The National Institute on Alcohol Abuse and Alcoholism (NIAAA) was treated more gently. Congress appropriated $11.5 million for research this year, and the budget requests $1.5 million less for next year.

The budget again would try to abolish all training at ADAMHA except for postdoctoral research fellowships. Although the continuing attack on training affects NIH as well, it hits hard at ADAMHA because the major chunk of training at that agency is a mix of clinical and research and because much of it traditionally has supported predoctoral study. For example, according to FY76 estimates for mental health training categories, clinical training totals $69.9 million, while the total for straight research training is $15 million.

Although the FY77 budget proposes $4 million for drug abuse training, $1 million more than requested last year, that figure is still $6 million short of the $10 million appropriated by Congress for FY76. The $2 million proposed for alcoholism training next year would be more than $5 million less than the Congress appropriated for FY76.

The plan to include community mental health centers

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Hearing on Navy Radio Project

In keeping with its newly announced policy of allowing limited public participation in the work of its government advisory committees, the National Academy of Sciences has announced that a committee which is looking into the biological and ecological effects of the Navy's controversial Project Seafarer (formerly called project Sanguine) will hold a public meeting on March 25 in Washington. Groups and individuals will have a chance to provide oral or written testimony. Staff officer is Samuel Abramson, NRC, 2101 Constitution Ave NW., Washington DC 20418.

...But Programs at NSF Are Slated to Increase

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and alcoholism treatment programs in the health block grant — drug programs are exempt for the timebeing — is unlikely to go far. But, proponents say that if it does, states are unlikely to keep services intact and many centers would ultimately go under or price themselves out of the reach of the needy.

Even if the block grant approach flops, the community mental health center program could be legislatively abolished anyway if Congress does not appropriate some money next year. The budget requested no funds for operating centers, providing only enough to pay declining federal commitments for staffing and children's services.

Where behavioral and social science activity is not tainted with the appearance of human services and social programs, the picture is less bleak. Cloaked in the respectability of the National Science Foundation's mission of relatively pure scientific inquiry, social and behavioral research would gain.

Behavioral and neural sciences would jump from $19.7 million this year to $24.4 million next year. Within that division, neuro-biology would get about $5.8 million; sensory physiology and perception about $3.8 million; and psychobiology would be in for about $3.4 million. Social and developmental psychology would increase from about $2 million to closer to $3 million and research on memory and cognitive processes would be pegged at near $2 million. Anthropology would stay about level at $4.6 million and the smallest program, linguistics, would receive about $1.8 million.

The reorganized social sciences division, now emphasizing sociology, economics and political science, would get a $3.2 million hike to $21.2 million. Continued program emphasis would be on fundamental research in social science methodology; organizational, institutional and economic behavior; and, advanced measurement techniques to analyze inflation, energy and productivity.

Even research activities at the National Institute of Education would get a $20 million assist, totaling $78.3 million out of a $90 million budget, to continue its increasingly targeted studies on basic skills, education policy issues, and education and work.—PM

New Decline in Atomic Orders

The latest set of figures published by ERDA on the status of the nuclear power program indicate that the nuclear industry is still in an economic depression, with orders for new reactors continuing to decline. Last year, utility companies cancelled orders for 12 new units, and deferred construction of 72 previously ordered units for periods of at least six months. Only 11 new orders were placed last year.

The lack of new orders results from a variety of factors, chief of which is the high capital cost of nuclear units - almost double that of coal-fired plants - and a slackening in the anticipated growth in demand for electrical energy. Even the Atomic Industrial Forum, the nuclear industry's trade association, reports that 1975 was "dismal in many respects."

NSF Finds Women's Pay Lags

A survey of scientists and engineers who have been employed for at least four years has revealed that women scientists are paid on the average less than their male counterparts in virtually every field of science. The survey, which was conducted by the Bureau of the Census with support from NSF, found that the median salary paid to male scientists in 1974 was $19,400, while women scientists earned an average of $15,700.

Though NSF notes that part of the difference is explained by the fact that the average age of the men who took part in the survey was 42 compared with 35 years for women, it also suggests that "other factors" contribute to the difference in salary levels.

Economists and atmospheric scientists reported the highest median salaries, $22,300, presumably because they mostly hold graduate degrees, while agricultural scientists who mostly hold batchelors' degrees, reported the lowest median salaries, $17,100.

(The report, NSF 75-332, is available free of charge from NSF, Washington DC 20550.)

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GAO Reports New Nuclear Garbage Problem

Though the problem of how to dispose of highly radioactive wastes from nuclear reactors has been well publicized, little public attention has so far been paid to another radioactive waste-disposal problem—millions of cubic feet of contaminated glassware, packaging, filters, reactor components and sludge generated by the nuclear industry. But an investigation conducted by the Congressional General Office (GAO) has turned up a number of disturbing facts about current disposal methods for such items.

Contaminated wastes are now buried at 6 commercial and 5 federally operated sites, which have been in use for between 4 and 30 years. According to the GAO report, however, insufficient studies have been conducted to determine "what mix of hydrogeological characteristics and engineering features offer the greatest assurance that radioactivity, once buried, will not migrate to create a possible public health hazard and require extraordinary and costly efforts to correct."

The GAO report also notes that since some of the wastes are contaminated with very long-lived radioactive compounds, monitoring and maintenance at disposal sites will be required for many centuries, but plans for such long-term care have not yet been formulated.

The report therefore recommends that studies should be undertaken immediately to determine the safety of present disposal sites, and that plans for long-term monitoring and maintenance of the sites should also be drawn up.

Two days after the report was published, the Environmental Protection Agency announced that plutonium and other radioactive materials have been found several hundred feet from a commercial burial site in Kentucky. Though the announcement notes that "at the present time this movement of plutonium and other radioactive materials does not present a public health hazard," it adds that "the potential long-range impact of these contaminants is not known." EPA also suggests that studies should be initiated to determine the hazards associated with burial of contaminated items, and it recommends that new methods should be developed for the disposal of wastes contaminated with long-lived isotopes.

The Nuclear Reegulatory Commission, which is responsible for ensuring the safety of the nuclear power program, has already proposed that wastes contaminated with plutonium should not be buried. And it has also agreed with the GAO recommendation that studies should be initiated to determine the safety of present disposal sites and to draft guidelines to ensure safe disposal in future.

The GAO report's suggestion that previous practices have been inadequately monitored could, however, develop into yet another major headache for the nuclear industry. According to EPA estimates, about 1 billion cubic feet of contaminated wastes, aside from spent reactor fuel, will have been generated by the year 2000.

(The report, *Improvements needed in the land disposal of radioactive wastes - a problem of centuries,* is available from GAO, Washington DC 20548 for $1)

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